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(56) Documents cited
GB A 2088593 GB 1101989 GB 0909997
GB 1227465 GB 1063658 GB 0846866
GB 1135441 GB 0992632

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G3P
Selected US specifications from IPC sub-classes F16K
G05D

(54) Safety device for flued gas appliance

(57) A flued gas appliance is described having a safety device comprising a gas control valve 2 placed in the gas supply line to the gas appliance, and a fusible plug 23 placed adjacent to an aperture communicating with the flue but not in the normal combustion product flow path of the appliance, the control valve 2 having a valve 9, a spring 16 for urging the valve 9 onto a seat 10, a diaphragm chamber 13 communicating with the gas flow path from the inlet of the control valve 9 and a diaphragm 15 connected to the valve 9 and arranged so as to at least hold open the valve 9 against the force of the spring 16 when gas pressure builds up in the diaphragm chamber 13, the fusible plug 23 closing a vent pipe 21 connected to the diaphragm chamber 13, the arrangement being such that if the flue becomes blocked in use, the combustion products are deflected over the fusible plug 23 which will eventually melt to release the pressure in the diaphragm chamber 13 and close the valve 9.

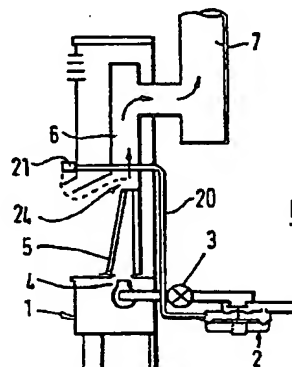


FIG. 1.

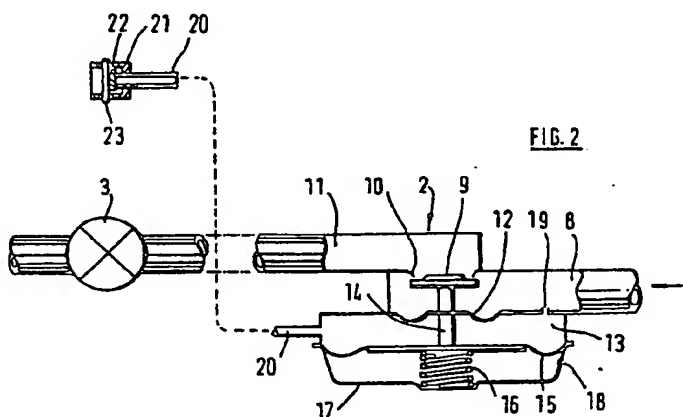


FIG. 2.

The drawing(s) originally filed was/were informal and the print here reproduced is taken from a later filed formal copy.

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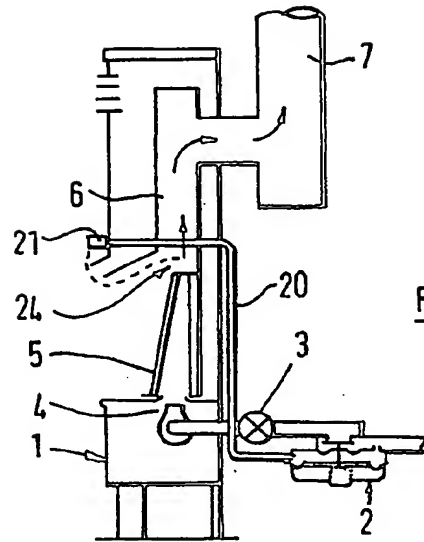


FIG. 1.

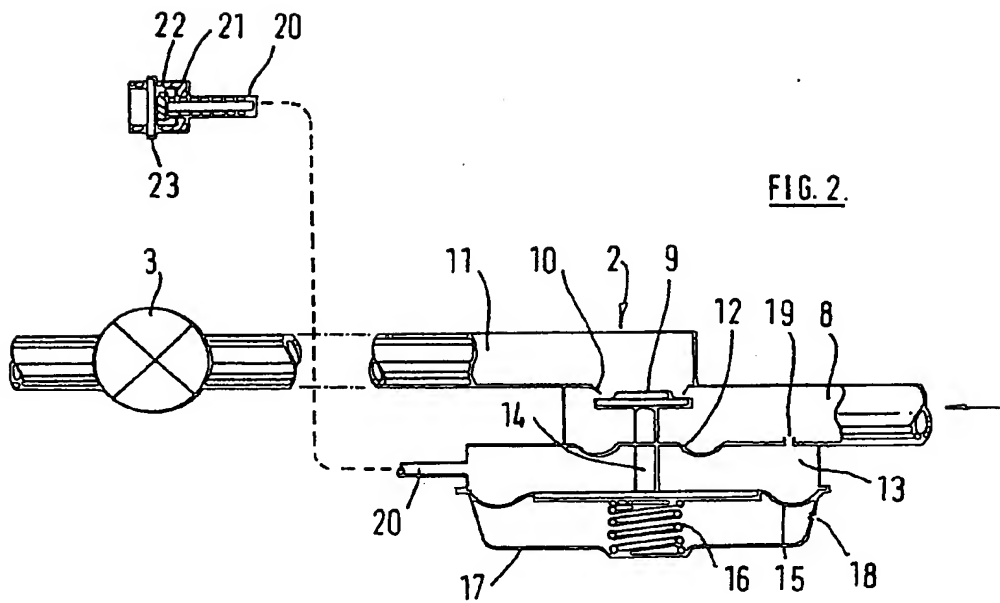


FIG. 2.

SPECIFICATION

Safety devices for flued gas appliances

- 5 This invention relates to a safety device for a flued gas appliance.
- In the event of a blockage of the chimney or flue of a gas appliance the products of combustion have no alternative but to pass
- 10 into the room in which the appliance is situated. For a short period of time this condition may not be noticed, but if it is prolonged then the room becomes stuffy and creates a drowsy effect upon the occupants which could
- 15 eventually become dangerous.
- In G.B. Patent No. 2,088,593 there is described and claimed a flued gas appliance having a safety device comprising a gas control valve placed in the gas supply line to the gas
- 20 appliance, and a fusible plug placed adjacent to an aperture communicating with the flue but not in the normal combustion product flow path of the appliance, the control valve having a valve, resilient means for urging the
- 25 valve onto a seat, a diaphragm chamber communicating with the gas flow path through the control valve and a diaphragm connected to the valve and arranged so as to at least hold open the valve against the force of the resilient means when gas pressure builds up in the
- 30 diaphragm chamber, the fusible plug closing a vent pipe connected to the diaphragm chamber, the arrangement being such that if the flue becomes blocked in use, the combustion products are deflected over the fusible plug
- 35 which will eventually melt to release the pressure in the diaphragm chamber and close the valve.
- In the event of temporary flue blockage
- 40 such as downdraught the products of combustion pass through an opening in the appliance designed so that the burner can continue to operate in a satisfactory manner. Under normal flue conditions that opening allows air to
- 45 be drawn from the room by the up draught caused by hot combustion gases passing up the flue. The temperature of this air stream, despite some effect by radiant and/or conducted heat, is relatively cool. Should down
- 50 draught occur for any reason and the hot gases are deflected down through this opening the temperature at this point rises significantly. This temperature rise is sensed by the fusible plug and used to cut off the fuel supply.
- 55 In a preferred embodiment described in the aforesaid patent, the diaphragm chamber communicates with the outlet side of the valve.
- This arrangement whilst being acceptable
- 60 suffers from the disadvantage that if the gas inlet pressure drops the gas pressure in the diaphragm chamber falls and the control valve is caused to close thereby cutting off the gas supply to the appliance. When gas pressure
- 65 increases, because the control valve is closed,

the gas supply to the appliance is cut-off. The only way of correcting the situation is to first close the main gas valve to the gas appliance which then allows sufficient pressure to build up in diaphragm chamber to cause the control valve to open.

- In accordance with the present invention there is provided a flued gas appliance having a safety device comprising a gas control valve placed in the gas supply line to the gas appliance, and a fusible plug placed adjacent to an aperture communicating with the flue but not in the normal combustion product flow path of the appliance, the control valve having a valve, resilient means for urging the valve onto a seat, a diaphragm chamber communicating with an inlet side of the gas flow path through the control valve and a diaphragm connected to the valve and arranged so as to at least
- 75 hold open the valve against the force of the resilient means when gas pressure builds up in the diaphragm chamber, the fusible plug closing a vent pipe connected to the diaphragm chamber, the arrangement being such that if the flue becomes blocked in use, the combustion products are deflected over the fusible plug which will eventually melt to release the pressure in the diaphragm chamber to close the valve.

- 95 This arrangement differs from the above patent in that the diaphragm chamber communicates with the inlet side of the valve.

- Gas inlet pressure enters the diaphragm chamber via a small weep passage and provided the outlet from this chamber is sealed by the fusible plug, the pressure will act on the diaphragm to open the valve and allow gas to pass to the appliance. If gas inlet pressure drops sufficiently for the diaphragm chamber pressure to fall such that the control valve is caused to close, because the diaphragm chamber communicates with the inlet side of the gas flow path, when the control valve closes, the gas pressure will build up in the diaphragm chamber and will cause the control valve to open. The arrangement is thus self-regulating and opening of the control valve does not have to rely on the main gas valve to the gas appliance being turned off.

- 115 In the accompanying drawings:

Figure 1 shows a typical arrangement of the device fitted to a gas fire.

Figure 2 shows the control valve in more detail.

- 120 In *Fig. 1* the gas fire 1 comprises a gas relay a control valve 2, a gas tap 3, a burner 4 placed such that flames and combustion products pass through radiant block 5, heat exchanger 6 and flue 7.
- 125 Referring to *Fig. 2*, the control valve 2 comprises an inlet passage 8, a valve 9 opening and closing against seat 10, and an outlet passage 11. The valve 9 is connected to a small diaphragm 12 which acts as a flexible seal between passage 11 and main diaphragm
- 130

chamber 13. The valve stem 14 passes through sealing diaphragm 12 and is connected to main diaphragm 15. A spring 16 urges valve 9 onto seat 10. The diaphragm 15 is held in place by cover 17 with breather hole 18 to atmosphere. Between the inlet passage 8 and the main diaphragm chamber 13 is a small weep hole 19 and from chamber 13 is a small bore pipe 20 which connects to a fusible plug body 21. Inside this body 21 is secured a fusible plug 22 clamped in a gas tight manner against the end of pipe 20 by cross pin 23.

As shown in Fig. 1 the gas fire has a vent space 24 between radiant block 5 and the flue 7. This is so that, in the event of a down draught due for example to wind, the combustion products can escape into the surrounding atmosphere without interfering with the burner. The fusible plug body 21 is placed just outside, so that in normal operation it remains relatively cool and is not exposed to the combustion products. The fusible plug 22 is so designed that if it is exposed to combustion products flowing out from the region 24 for more than a short time, the plug will melt.

The action of the control is as follows:—
Gap tap 3 is closed. Gas is supplied to valve 2 at inlet 8. A small supply of gas passes through weep 19 into chamber 13 and, provided plug 22 is sealing the end of tube 20, builds up a pressure over diaphragm 15 to overcome spring 16 and open valve 9. When tap 3 is opened gas passes to burner 4 and is ignited.

If flue 7 is clear then the flue products pass away to atmosphere and there is no undue heating of the plug 22. Should the flue become blocked then the flue products are deflected down through the front vent 24 of the fire and pass upwards over the plug 22. The plug heats up and eventually melts thereby unsealing the end of pipe 20. This now releases the pressure in chamber 23 because weep 19 is insufficient to maintain the pressure and the spring 16 closes valve 9 shutting off the gas supply. The only leak past the valve is through weep 19 and this is insignificant. Valve 2 will not re-open until fuse 22 is replaced.

CLAIMS

1. A flued gas appliance having a safety device comprising a gas control valve placed in the gas supply line to the gas appliance, and a fusible plug placed adjacent to an aperture communicating with the flue but not in the normal combustion product flow path of the appliance, the control valve having a valve, resilient means for urging the valve onto a seat, a diaphragm chamber communicating with an inlet side of the gas flow path through the control valve and a diaphragm connected to the valve and arranged so as to at least hold open the valve against the force of the

resilient means when gas pressure builds up in the diaphragm chamber, the fusible plug closing a vent pipe connected to the diaphragm chamber, the arrangement being such that if the flue becomes blocked in use, the combustion products are deflected over the fusible plug which will eventually melt to release the pressure in the diaphragm chamber to close the valve.

2. A flued gas appliance having a safety device substantially as hereinbefore described with reference to the accompanying drawing.

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